

IN THE CLAIMS

1. (Currently Amended) A speech signal decoding method characterized by comprising the steps of:
- decoding information containing at least a sound source signal, a gain, and filter coefficients from a received bit stream;
 - identifying voiced speech and unvoiced speech of a speech signal using the decoded information;
 - performing smoothing processing based on the decoded information for at least either one of the decoded gain and the decoded filter coefficients, said smoothing performed only in the unvoiced speech; and
 - decoding the speech signal by driving a filter (1040) having the decoded filter coefficients by an excitation signal obtained by multiplying the decoded sound source signal by the decoded gain using a result of the smoothing processing.
2. (Original) A method according to claim 1, wherein
- the method further comprises the step of classifying unvoiced speech in accordance with the decoded information, and
 - the step of performing smoothing processing comprises the step of performing smoothing processing in accordance with a classification result of the unvoiced speech for at least either one of the decoded gain and the decoded filter coefficients in the unvoiced speech.
3. (Original) A method according to claim 1, wherein the identifying step comprises the step of performing identification operation using a value obtained

by averaging for a long term a variation amount based on a difference between the decoded filter coefficients and their long-term average.

4. (Original) A method according to claim 2, wherein the classifying step comprises the step of performing classification operation using a value obtained by averaging for a long term a variation amount based on a difference between the decoded filter coefficients and their long-term average.

5. (Original) A method according to claim 1, wherein
the decoding step comprises the step of decoding information containing pitch periodicity and a power of the speech signal from the received bit stream, and
the identifying step comprises the step of performing identification operation using at least either one of the decoded pitch periodicity and the decoded power.

6. (Original) A method according to claim 2, wherein
the decoding step comprises the step of decoding information containing pitch periodicity and a power of the speech signal from the received bit stream, and
the classifying step comprises the step of performing classification operation using at least either one of the decoded pitch periodicity and the decoded power.

7. (Original) A method according to claim 1, wherein
the method further comprises the step of estimating pitch periodicity and a power of the speech signal from the excitation signal and the decoded speech signal, and

the identifying step comprises the step of performing identification operation using at least either one of the estimated pitch periodicity information and the estimated power.

8. (Original) A method according to claim 2, wherein the method further comprises the step of estimating pitch periodicity and a power of the speech signal from the excitation signal and the decoded speech signal, and

the classifying step comprises the step of performing classification operation using at least either one of the estimated pitch periodicity and the estimated power.

A2 9. (Original) A method according to claim 2, wherein the classifying step comprises the step of classifying unvoiced speech by comparing a value obtained by the decoded filter coefficients with a predetermined threshold.

SUR PD 10. (Currently Amended) A speech signal decoding apparatus characterized by comprising:
a plurality of decoding means for decoding information containing at least a sound source signal, a gain, and filter coefficients from a received bit stream;
identification means for identifying voiced speech and unvoiced speech of a speech signal using the decoded information;
smoothing means for performing smoothing processing based on the decoded information for at least either one of the decoded gain and the decoded filter coefficients in only the unvoiced speech identified by said identification means; and
filter means which has the decoded filter coefficients and is driven by an excitation signal obtained by multiplying the decoded sound source signal by the

decoded gain, at least either one of the decoded filter coefficients and the decoded gain using an output result of said smoothing means.

11. (Original) An apparatus according to claim 10, wherein
said apparatus further comprises classification means for classifying
unvoiced speech in accordance with the decoded information, and
said smoothing means performs smoothing processing in accordance
with a classification result of said classification means for at least either one of the
decoded gain and the decoded filter coefficients in the unvoiced speech identified by
said identification means.

AZ 12. (Original) An apparatus according to claim 10, wherein said
identification means performs identification operation using a value obtained by
averaging for a long term a variation amount based on a difference between the
decoded filter coefficients and their long-term average.

13. (Original) An apparatus according to claim 11, wherein said
classification means performs classification operation using a value obtained by
averaging for a long term a variation amount based on a difference between the
decoded filter coefficients and their long-term average.

14. (Original) An apparatus according to claim 10, wherein
said decoding means decodes information containing pitch periodicity
and a power of the speech signal from the received bit stream, and
said identification means performs identification operation using at least
either one of the decoded pitch periodicity and the decoded power output from said
decoding means.

15. (Original) An apparatus according to claim 11, wherein
said decoding means decodes information containing pitch periodicity
and a power of the speech signal from the received bit stream, and
said classification means performs classification operation using at least
either one of the decoded pitch periodicity and the decoded power output from said
decoding means.
16. (Original) An apparatus according to claim 10, wherein
said apparatus further comprises estimation means for estimating pitch
periodicity and a power of the speech signal from the excitation signal and the decoded
speech signal, and
said identification means performs identification operation using at least
either one of the estimated pitch periodicity and the estimated power output from said
estimation means.
17. (Original) An apparatus according to claim 11, wherein
said apparatus further comprises estimation means for estimating pitch
periodicity and a power of the speech signal from the excitation signal and the decoded
speech signal, and
said classification means performs classification operation using at least
either one of the estimated pitch periodicity and the estimated power output from said
estimation means.
18. (Original) An apparatus according to claim 11, wherein said
classification means classifies unvoiced speech by comparing a value obtained by the
decoded filter coefficients from said decoding means with a predetermined threshold.

19. (Currently Amended) A speech signal decoding/encoding method characterized by comprising the steps of:

encoding a speech signal by expressing the speech signal by at least a sound source signal, a gain, and filter coefficients;

decoding information containing a sound source signal, a gain, and filter coefficients from a received bit stream;

identifying voiced speech and unvoiced speech of the speech signal using the decoded information;

performing smoothing processing based on the decoded information for at least either one of the decoded gain and the decoded filter coefficients in only the unvoiced speech; and

decoding the speech signal by driving a filter having the decoded filter coefficients by an excitation signal obtained by multiplying the decoded sound source signal by the decoded gain using a result of the smoothing processing.

20. (Currently Amended) A speech signal decoding/encoding apparatus characterized by comprising:

speech signal encoding means (Fig. 3) for encoding a speech signal by expressing the speech signal by at least a sound source signal, a gain, and filter coefficients;

a plurality of decoding means for decoding information containing a sound source signal, a gain, and filter coefficients from a received bit stream output from said speech signal encoding means;

identification means for identifying voiced speech and unvoiced speech of the speech signal using the decoded information;

smoothing means for performing smoothing processing based on the decoded information for at least either one of the decoded gain and the decoded filter coefficients in only the unvoiced speech identified by said identification means; and filter means which has the decoded filter coefficients and is driven by an excitation signal obtained by multiplying the decoded sound source signal by the decoded gain, at least either one of the decoded filter coefficients and the decoded gain using an output result of said smoothing means.